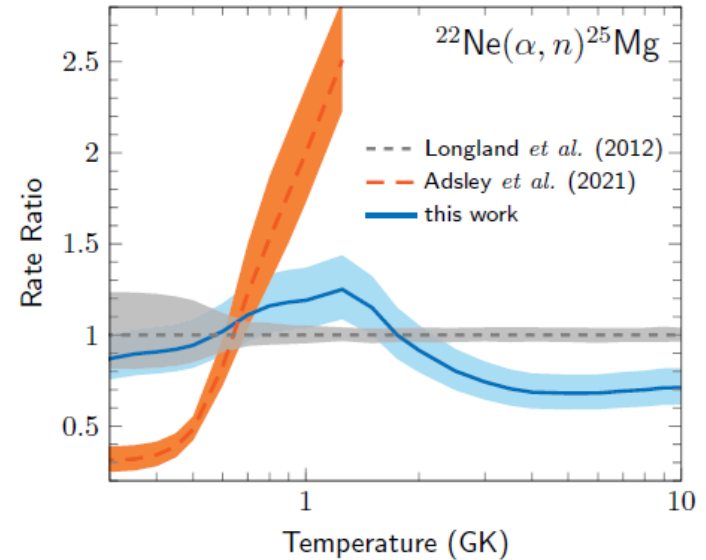
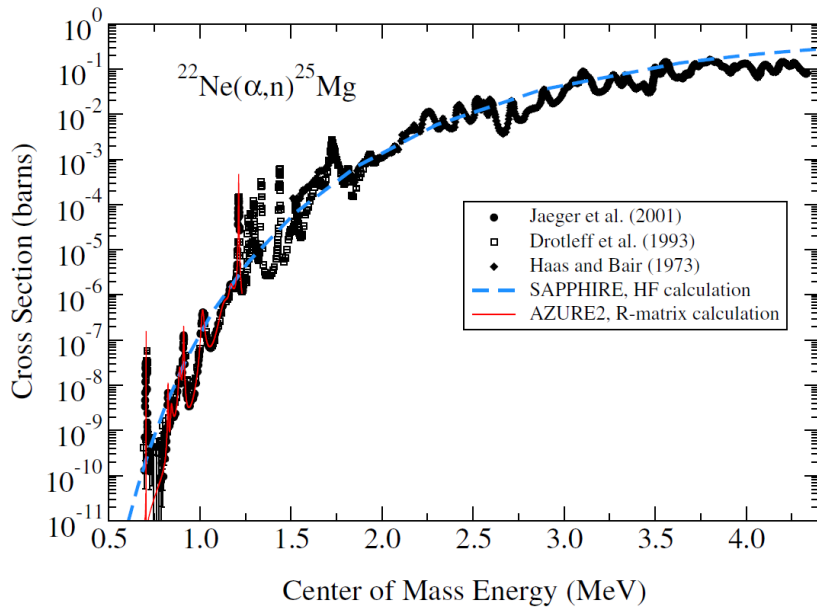


# The resonances in the $^{22}\text{Ne}+\alpha$ fusion reactions

The interplay and correlation between the  $^{22}\text{Ne}(\alpha, \gamma)^{26}\text{Mg}$  and the competing  $^{22}\text{Ne}(\alpha, n)^{25}\text{Mg}$  reaction plays an important role for the interpretation of the  $^{22}\text{Ne}(\alpha, n)^{25}\text{Mg}$  reaction as a neutron source in the *s*- and *n*-processes. This paper provides a summary and new data on the  $\alpha$ -cluster and single-particle structure of the compound nucleus  $^{26}\text{Mg}$  and the impact on the reaction rate of these two competing processes in stellar helium burning environments.



Using a more accurate method that combined R-matrix fits and direct numerical integration of the experimental data, it was showed that significant differences in the reaction rate were obtained compared to the narrow resonance approximation formalism or the Hauser-Feshbach statistical model that have been widely used in previous publications. Further, we discuss issues with an underestimation of the rate uncertainty above 0.5 GK.